CLAIMS:

1. A method for the determination of an analyte in a sample, said method comprising:

(a) providing a catalytic polynucleotide;

(b) contacting said catalytic polynucleotide with said sample so that the catalytic polynucleotide may bind to the analyte;

(c) providing assay conditions such that said catalytic polynucleotide produces an optically detectable signal in the presence of the analyte; and

(d) detecting said signal, thereby determining the presence of the analyte in the sample.

2. The method of claim 1 wherein said catalytic polynucleotide is a DNAzyme.

3. The method of claim 1 wherein said catalytic polynucleotide is capable of peroxidase activity.

4. The method of claim 3 wherein said catalytic polynucleotide is complexed with hemin.

5. The method of claim 1 wherein said optically detectable signal is produced by a light emitting reaction.

6. The method of claim 5 wherein said light emitting reaction is produced using luminol as a substrate.

7. The method of claim 1 wherein said optically detectable signal is produced by production of a colorimetric product.

8. The method of claim 7 wherein said colorimetric product is produced using the substrate 2,2'-azinobis(3-ethylbenzothiozoline)-6-sulfonic acid (ABTS).

9. The method of claim 1 further comprising the following step:

(e) comparing the optically detectable signal detected in step (d) with a calibration scale, thereby quantifying the amount of analyte in the sample.

10. The method of claim 1 wherein the analyte is immobilized to a solid surface.

11. The method of claim 10 wherein the analyte is one member of a complex forming group, the method comprising:

(a) immobilizing the analyte on a solid surface;

(b) providing a catalytic polynucleotide bound to another member of said complex forming group;

(c) contacting the catalytic polynucleotide with the solid surface under conditions allowing binding between the two members of the complex forming group;

(d) removing unbound catalytic polynucleotide;

(e) providing assay conditions to allow the catalytic polynucleotide to catalyze a reaction yielding an optically detectable signal; and

(f) detecting said optically detectable signal, thereby detecting the presence of the analyte in the sample.

12. The method of claim 1 wherein a plurality of catalytic polynucleotides are bound to a bead-like particle.

13. The method of claim 1 wherein the analyte is a nucleic acid sequence.

14. The method of claim 13wherein said analyte is a telomere repeat unit.

15. A method according to claim 1 for the detection of telomerase in a sample, the method comprising:

(a) providing a primer for telomerase activity immobilized on a solid surface;

(b) contacting the sample with said solid surface in the presence of deoxynucleoside triphosphoric acids

(dNTP's), under conditions enabling formation of a telomere repeat unit;

(c) adding a catalytic polynucleotide, attached to a sequence complementary to the telomere repeat unit under conditions that allow hybridization of said sequence to the telomere repeat unit;

(d) removing unbound catalytic polynucleotide;

(e) providing substrates for the catalytic polynucleotide to produce an optically detectable signal; and

(f) detecting said signal, the signal indicating the presence of telomerase in the sample.

16. A method for detection of an analyte being one member of a complex forming group in an assay sample, the method comprising:

(a) providing a pre-catalytic polynucleotide comprising a catalytic polynucleotide moiety attached to an inhibitory moiety comprising another member of the complex forming group, said inhibitory moiety in the absence of the analyte sterically hindering the catalytic activity of the catalytic polynucleotide while in the pre-catalytic complex, and said steric hindrance being removed upon binding of the inhibitory moiety to the analyte;

(b) contacting said pre catalytic complex with said assay sample under binding conditions;

(c) providing assay conditions which allow the catalytic polynucleotide to catalyze a reaction yielding an optically detectable signal; and

(d) detecting said signal, thereby detecting the presence of the analyte in the assay sample.

17. A method according to claim 16 for the detection of telomerase in a sample, the method comprising:

(a) providing a pre-catalytic polynucleotide comprising a catalytic polynucleotide attached to an inhibitory moiety, said inhibitory moiety comprising a sequence which is complementary to a telomere repeat unit, the inhibitory moiety, in the absence of the telomere repeat unit, inhibiting the catalytic activity of the catalytic polynucleotide while in the pre-catalytic polynucleotide, the pre-catalytic polynucleotide further comprising a primer for telomerase elongation;

(b) contacting the pre-catalytic polynucleotide with the sample in the presence of dNTPs and under conditions enabling formation of one or more telomere repeat units;

(c) providing substrates for the catalytic polynucleotide; and

(d) detecting an optically detectable signal of the catalytic polynucleotide, detection of the signal being indicative of the presence of telomerase in the sample.

18. A method for detection of telomerase activity in a sample the method comprising:

(a) providing a primer for telomerase activity immobilized on a solid surface;

(b) contacting the sample with the immobilized primer in the presence of dNTP's, under conditions enabling formation of a telomere repeat unit;

(c) adding a catalytic polynucleotide, attached to a sequence complementary to the telomere repeat unit;

(d) removing unbound catalytic polynucleotide;

(e) providing substrates for the catalytic polynucleotide; and

(f) detecting the presence of catalytic products of the catalytic polynucleotide, the products indicating the presence of telomerase activity in the sample.

19. A method for detection of the presence of catalytically active telomerase in a sample, the method comprising:

(a) providing a pre-catalytic polynucleotide comprising a catalytic polynucleotide attached to an inhibitory moiety, said inhibitory moiety comprising a sequence which is complementary to a telomere repeat unit, the inhibitory sequence, in the absence of the telomere repeat unit, inhibiting the catalytic activity of the catalytic polynucleotide while in the pre-catalytic polynucleotide, the pre-catalytic polynucleotide further comprising a primer for telomerase elongation;

(b) contacting the pre-catalytic polynucleotide with the sample in the presence of dNTPs and under conditions enabling primer elongation by telomerase;

(c) providing substrates for the catalytic polynucleotide; and

(d) detecting the presence of catalytic products of the catalytic polynucleotide, detection of the products being indicative for the presence of telomerase in the sample.

20. The method of claim 19 comprising the further step between steps (b) and (c) of providing a co-factor required for the catalytic polynucleotide activity.